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Creative Problem Solving with Higher Order Thinking Problem in Learning Mathematics

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Abstract

Creative Problem Solving (CPS) is derived from creative, problem, and solving. Creative is an idea that has an element of novelty or uniqueness and have value and relevance. Problem or issue is a situation that challenges, opportunities while solving means devised a way to solve a problem. CPS literally means the ability to plan a way / new and unique idea to solve a problem that is encountered (Mitchell and Kowalik, Manoy 2014).

In mathematics learning problems faced by students in the form of questions, but not all questions will be a problem. If the question implies a challenge and cannot be solved by a routine procedure that is already known to the student, then the question is a problem. Problem is an issue for students is a matter that requires higher-level thinking processes (Higher Order Thinking) for example about the open ended. Problem of this kind requires students to create, analyze, and evaluate what he has done. Problems of this kind in accordance with the 2013 that characterized scientific curriculum.

The purpose of this study to determine students' creativity in solving mathematical problems (about the open ended) relates to everyday life. The research was conducted in grade 7 SMP 6 Nganjuk. The main instrument in this study is researcher because the researcher as collectors and data analysis. Instrument support is a matter of learning the problem-solving and interview guides to collect data. Techniques of data analysis done by analyzing the test results and problem solving interviews then the data were analyzed to see the students' creativity in problem solving.
Keywords: creative problem solving, higher order thinking

A. Introduction

Curriculum 2013 is characterized by scientific means more attention to the creativity of students in learning activities. To make the matter as demanded by the curriculum in 2013, researchers used questions that Higher Order Thinking (HOT). Higher Order Thinking or higher order thinking refers to thinking and problem-solving strategies that allow one to access, sort and digest some of the information. Higher Order Thinking Questions are questions that tend to be complex, non-algorithmic, and has plenty of solutions that enable a person to access, sort and digest some of the information before answering the question. As per the expectations of researchers, students will analyze and then answer the questions given and written answers will be evaluated again the truth and trying to answer a variety of ways according completion of students' thinking. Creative Problem Solving (CPS) is the ability to plan a way / new and unique idea to solve a problem faced by

By using the CPS approach and about HOT, expected at the time of completing a problem, the thinking of students can be more creative, critical, skilled and motivated not only on the sample - the sample questions given by the teacher but the students gain the maximum benefit in the process of thinking and results learning.

B. Creativity

Creativity is closely related to creative thinking, because creativity is a product of creative thinking. Creative thinking is an idea that has an element of novelty or uniqueness and have value and relevance (Mitchell and Kowalik, 1999, Manoy 2014).

To assess the ability to think creatively, there are three components of creativity assessment which is based on the Torrance Tests of Creative Thinking, namely: fluency, flexibility, and novelty (Khabibah et al, 2007). Students are said to be fluent (fluent) if students solve problems HOT with various solutions and answers. Students are said to be flexible if students solve problems in a HOT one way and then finish it in another way, and novelty properties owned by the student if he checked the answer with the various methods of completion and then create a new and different method.

C. Result and Discussion

Researchers collected observational data on class VII-6 and VII-8 SMP 6 Nganjuk as many as 54 students. The purpose of this observation to see whether the learning activities, especially in solving problems, students are able to use creative thinking. Materials provided related to the geometry of square and rectangular. Problem is proposed as follows.

Mrs. Susi has a garden with a size of 80m x 40m. In the garden will be in order seeds - seeds that have been planted flowers in pots - small pots, the flower seeds (red roses, white roses, jasmine and orchid). For seedlings of red roses and white roses arranged with a rectangular shape. For jasmine and orchid flower seeds will be in the system with a square shape. a. Help Mrs. Cruz to organize the garden! (include the design). b) Determine the length, width and extent of each - each setting of the flower seeds.

Having regard answers and designs made students, from 54 students who work on the problems, there are 38 students or 70.37% of students make the same design as in Figure 1, there are 5 students or 9.26% of students who did not make the design, and 11 students or 20.37% of students who need confirmation (Figure 2)

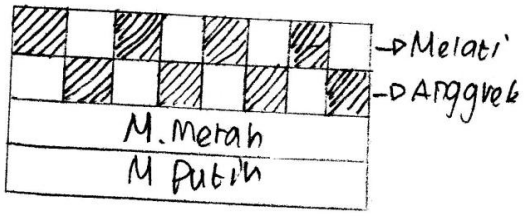


Figure 1

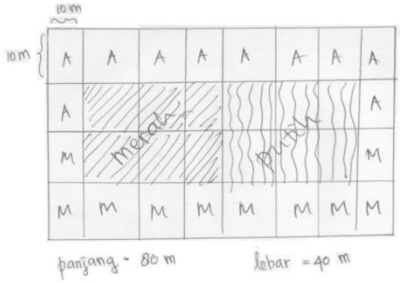


Figure 2

In Figure 2 is said to need confirmation because the requirements requested in the matter of the arrangement of red roses and white roses while the rectangular shaped orchid and jasmine flowers laid out square shapes. If seen the arrangement of orchids and jasmine rectangular

After Done using the learning steps CPS, students are given a problem like the following.

SMP 6 Nganjuk area there is a vacant land measuring 40m x 30m, the principal plans to build a rectangular shaped pool and pool side addition will be made square-shaped flower garden. a) Help the principal to determine the length and width of the pool and the flower garden (design included). b) How large is the swimming pool and

flower garden to be created? C) How many flower garden plots that can be made around the pool?

Of the 34 students who take the test with about HOT and made the students pay attention to the design, it was concluded that all students answer the same way as 3 Figure 3, Figure 4 and Figure 5 also completed because the same way.

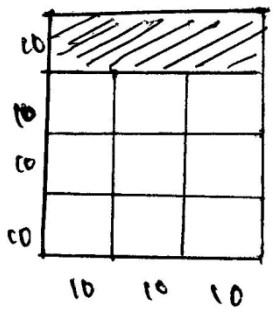


Figure 3

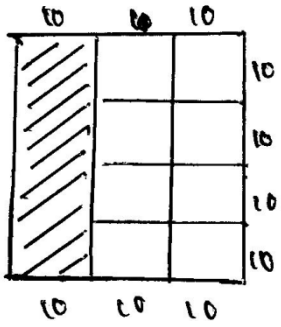


Figure 4

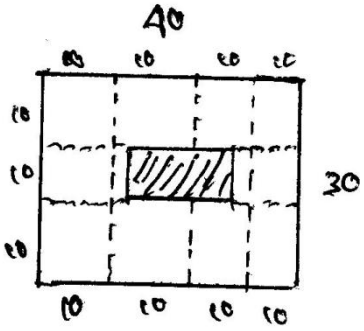


Figure 5

Researchers take one of the students selected in interviews as an example of the results of the interview.

Consider the following interviews.

P= researcher S = student

P : " After reading, what do you understand from the question?"

S :"In the area of SMP Negeri 6 Nganjuk there is a vacant lot that measuring 40m x 30m, the principal plans to build a rectangular shaped swimming pool and on the side - beside the swimming pool will be created flower garden square."

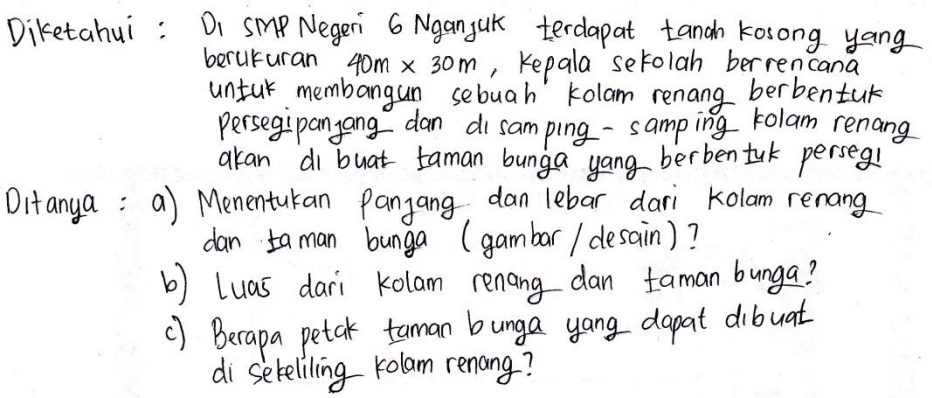
P :"Furthermore, what do you think after reading about the question?"

S :"(a).Determining the length and width of the pool and flower garden such, makes design / picture."

"(b). Determining comprehensive pool and flower garden."

"(c). Specifies the number of plot - flower garden plots that can be made around the pool."

Results of student work

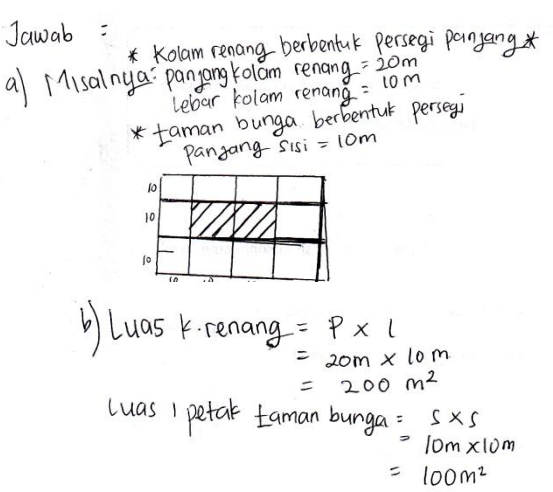

Diketahui : Di SMP Negeri 6 Nganjuk terdapat tanah kosong yang berukuran 40m x 30m, kepala sekolah berrencana untuk membangun sebuah kolam renang berbentuk persegipanjang dan di samping - samping kolam renang akan di buat taman bunga yang berbentuk persegi

Ditanya : a) Menentukan panjang dan lebar dari kolam renang dan taman bunga (gambar / desain)?

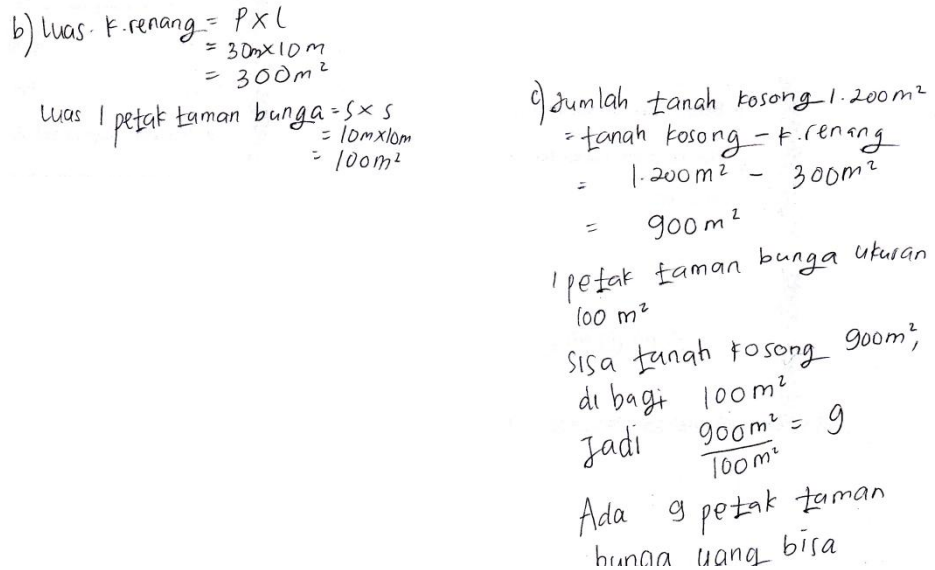
b) Luas dari kolam renang dan taman bunga?

c) Berapa petak taman bunga yang dapat dibuat di sekeliling kolam renang?

Search results based on the data written and interview data given S, S start by writing down what is known and what is asked. Then goes on to consider the question a) which determine the length and width of the pool and garden flowers, images and designs as follows.



If the written response of the outcome S, S makes 2 garden design and preliminary design of the S pool at the center of the flower garden with a size of 20m x 10m. While the flower garden made square shaped. In answer to b) S says that the square size is 10m x 10m which means flower garden area of 1 100m2 plot, and the answer c) S confirms that there are 10 flower garden plots. Note the second draft made S



S a swimming pool is in the left position with a land size of 30m x 10m, and then continue the calculation as is done in the first step.

Results of interviews

P : " In addition to what you mentioned earlier is there anything else?"

S : " there is no."

Questions were asked to check students' thinking with regard to what is known and asked. Answer students no means the information provided S is complete.
results of interviews

……

P : " What do you think the strategy / how to resolve the problem?"

S : " Using a broad strategy for rectangle and square, in addition to the using integer operations strategy."

……..

Asked with regard to strategy and how to solve problems HOT, students using a broad strategy for rectangular and square and integer operations. ……..

P : " Can you explain the steps - steps in outline in solve the problem in a matter of?"

S: "(a). To determine the length and width of the pool and gardens the flowers, I first multiply the size of bare soil to make it easier to calculate the 40m x 30m, then Letting the length and width of the pool, and letting length side - side for 1 flower garden plots, besides describing / designing."

"(b). To determine the pool and garden area of interest, from the results in question (a) I've been letting the length and width of the pool and the long sides - one side of the flower garden plot, so just enter the formula into a large rectangle and square."

"(c). To determine the many plots - plots that can flower garden made around the pool, on the results that have been obtained in question (a) and (b) it can be calculated how many flower garden plots can be made of many vacant land remaining unused,."

……..

S was asked to explain the steps in solving the problem, it turns out to first multiply S bare land size to make it easier to calculate the 40m x 30m, then Letting the length and width of the pool, and letting length sides - one side for the flower garden plots, other than that described / designed it and the next step to enter into the living area of the rectangle and square formula, also counts many flower garden plots can be made of the number of vacant land remaining unused,.……

P : " Are you sure that your answer is correct?"

S : "sure."

P : " How do you believe that the answer is correct?"

S : " Because I have counted many - times."

P : " Has it been checked?"

S : " already."

P : " When is check the results of the work?"

S : " At the time of doing."

P : " How do you check?"

S : " When counting it."

P : " Do you think there are other ways that can be used to solve the problem in a matter of?"

S : " there are."

……..

Following question to see the answer confidence made S, S believes the answer, because it is calculated many times. The next question is whether it has been held to check on the work and when it's time. It turned out checks coincided with when working, and it's still has a trick to do but not implemented by S.

Based on the results of the work and the results of interviews with S can be described as follows.

To determine creativity in solving HOT S made, it will be checked using the creativity requirement fluency, flexibility, and novelty. S solving HOT more than one solution so eloquently requirements are met. S can solve HOT problems with two-way flexibility so that requirements are met. From the results of the work, the S does not qualify novelty because there is no distinct and unique settlement raised S. Of the three terms, we can conclude that S is not creative. In addition to S researchers see all student work and how to answer it turns out the answer is the same as that made S. In general it can be concluded that the SMP 6 Nganjuk students of class VII-6 are not creative.

D. Discussion and Closing

Based on the results of student work and interviews, it was revealed that 100% of students did not include the creative category because of evidence supporting that of 54 students who work on the problems, there are 38 students or 70.37% of students make the same design as in Figure 1, there are 5 students or 9.26% of students who did not make the design, and 11 students or 20.37% of students who need to be confirmed (Figure 2). The way students answer using routine procedures taught in the classroom but the results have not been creative students answer because there is no unique answer alternatives. From the discovery of the field can be concluded that the ability of the CPS is the ability to plan a way / new and unique idea to solve a problem faced by the students needs to be improved so that the students need to be taught SMP 6 Nganjuk methods Creative Problem Solving (CPS) in Mathematics Learning.

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